The Central Institute of Fisheries Technology, Ernakulam

Fish is a valuable source of food, rich in proteins. India has abundant marine and inland fish resources. She has a coastline of over 4,500 km. in length and a continental shelf of over 2½ lakh sq. km. in area which offers considerable scope for the establishment of fisheries. The Bay of Bengal and the Arabian Sea abound in fishing grounds; gulfs and bays all along the coast and waters around islands are rich sources of marine fish. Tidal estuarine waters in the mouths of large and perennial rivers, large brackish water lakes, backwaters, lagoons and swamps scattered along the entire coastline afford lucrative estuarine fisheries. Vast stretches of fresh water consisting of rivers, streams, lakes, reservoirs, tanks, ponds and paddy fields offer scope for inland fisheries. The annual production of fish in India is about one million tonnes of which 66% is obtained from the sea. From this yield the per capita consumption is computed at 1.52 kg. per year. But to meet the nutritional needs of the country a ten-fold increase in fish production is considered necessary. At present our existing resources are not being properly utilised. Until recently fishing in Indian seas was confined to a narrow coastal belt, 11-16 km. in width and the rich offshore and deep waters remained completely unexplored and unexploited. This was largely due to the inadequacy and unsuitability of the fishing craft and gear in use. Further over 49% of the total fish landings are sun-dried, salted or pickled for future consumption. But the curing processes are by and large unscientific and the product is inferior. A good part of the landings in different parts of the country gets spoiled owing to lack of adequate transport and preserving facilities and is used as manure or otherwise disposed of.

The scientific exploitation of the fishery resources is not only important for meeting the acute shortage of protein foods in India but is also necessary for raising the socio-economic status of the fishermen numbering about a million, who constitute one of the poorest and most backward communities. This can be achieved by increased catch of fish by application of techniques and equipment which are to be developed through research and development in crafts and gears suitable under local conditions. Storage, transport and preservation of the landed fish form an integral part of any scheme for exploitation of fisheries. The development of these facilities on scientific lines is to be based on studies on the causes of spoilage of fish, effect of different treatments on the nutritive value and consumer acceptance of the product, development of better processes and techniques for preservation, utilisation of by-product of processing industries etc. Fish and fish products have also proved to be a valuable foreign exchange earner. The earnings of foreign exchange through export of preserved and frozen fish and fish products have steadily increased in recent years. But export market in preserved fish is highly

quality-conscious and competitive. To retain and extend the volume of export of fishery products efficient quality control measures through introduction of improved methods of handling, processing and preservation are necessary.

In appreciation of the pressing need for coordinated research in various aspects of fishery technology, and for the over-all development of fisheries industries in India, the Ministry of Food and Agriculture had decided to set up the Central Institute of Fisheries Technology. The Institute was established in 1957 at Cochin (Ernakulam).

As the type of fish and fishing conditions vary at different regions of India, it was also decided to set up sub-stations and units of the Institute at different representative localities to take care of these variations, to evolve craft and gears and processing techniques suitable for the regions. One sub-station at Veraval and another at Kakinada were opened in 1962. One unit was started in Bombay in 1958 and another unit was set up at Calicut in 1962. Another sub-station mainly for investigating problems of crafts and gears for inland fisheries was established at Hirakud (Orissa) in 1963.

The research work at the Institute including its sub-stations and units is carried out in two wings — Craft and Gear Wing and Processing Wing. The third wing, the Extension, Information and Statistics Wing, renders a very useful service by functioning as a liaison between the research laboratories and the industry.

Craft and Gear Wing

This wing of the Institute was organised first. The chief objectives of the work undertaken in this wing and the sub-stations are designing of boats, studies on craft and gear materials, gear and mechanical fishing accessories and their preservation, and investigations on engines used in fishing boats.

The Wing consists of the following Sections :

Gear Branch	Materials Section
	Design Section
	Survey Section
	Fishing Methods Section
Craft Branch	Boat Design Section
	Craft Materials Section
	Mechanical Engineering Section

The important investigations undertaken at the wing fall under the following broad headings :

1. Survey of indigenous fishing gear and methods as a prelude for modification of the existing gear and introduction of more effective modern tackles.
2. Evaluation of the characteristics of different gear materials like twines, floats, ropes etc. and testing them for quality standards. (Photo 1)

(Photo 1)

Fishing twine being examined for its dynamic characteristics in the gear research laboratories at the Institute.

(Photo 2)

Fishing net being fabricated as per design made at the Institute and being got ready for its performance studies.

3. Studies on the rotting and deterioration due to weathering of different materials, method of protection against these, and evaluation of the qualities of the different preservatives on the various gear materials.
4. Designing of suitable tackles for different fisheries including mesh selectivity studies and comparative catch efficiency of different gear and gear of different materials.
5. Operation of prototype gear. (Photo 2)
6. Designing of fishing vessels taking into account the special conditions and requirements of different fisheries and areas.
7. Studies on the selection of propellers for optimum power utilization under different conditions of fishing, specially trawling.
8. Investigations on the structural layout of wooden fishing vessels with a view to economising on materials and arriving at best strength/weight ratio.
9. Building and testing of prototype fishing vessels. (Photo 3)
10. Investigations on the different craft materials with particular reference to the selection of suitable timbers for boat building, fastenings, hull sheathing materials and marine paints.
11. Biological investigations on marine boring and fouling organisms with a view to suggesting proper preventive measures.
12. Studies on wood preservatives under marine conditions.
13. Studies on marine corrosion and their prevention in fishing boats. (Photo 4)
14. Designing of mechanical fishing accessories. (Photo 4a)
15. Studies on the common causes of trouble in installation, running and maintenance of engines.
16. Investigation on suitable propulsion system for fishing in inland waters and for country crafts.
17. Designing of electrical equipments and accessories for electrical fishing and carrying out experiments on electrical fishing.
18. Testing the electrical materials and drawing up a standard for using in fishing boats.

Apart from the above the wing has also conducted *adhoc* training courses in various aspects of craft and gear technology for Indian as well as foreign trainees.

Processing Wing

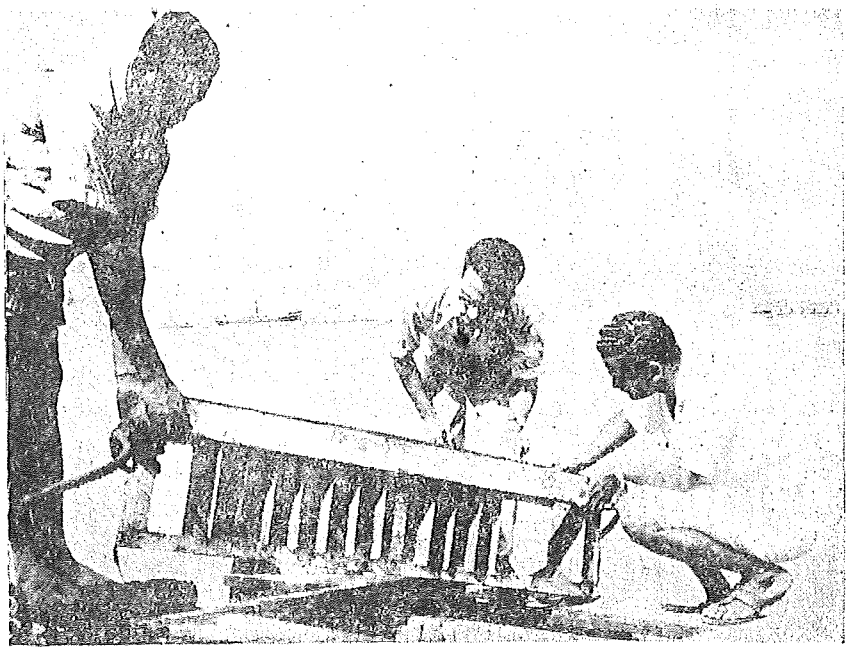
The Processing Wing of this Institute was set up in 1958 at Ernakulam. This wing comprises following sections :

1. Chemistry
2. Bacteriology
3. Processing and Engineering.

(Photo 3)

A new design drawing for a mechanised fishing boat being drawn at the Craft Research Laboratories of the Institute.

(Photo 4)



Wooden panels being examined at the test site of the Institute for the study of the effect of marine borers and foulers on different woods and the efficacy of different preservatives used.

4. Fish Curing
5. By-products
6. Quality Control.

The activities of the Processing Wing are varied and cover all phases (both fundamental and applied aspects) of fish processing technology. Particular emphasis is given to the study of problems in (1) handling, preservation, storage and transport of fresh and ice-stored fishery products, (2) freezing and frozen storage, (3) canning, (4) utilization of surplus fish as well as fish wastes, (5) preparation and utilization of fish body oil for industrial purpose, and (6) designing of equipments for the fish processing industry. The Quality Control Section also carries out regular checks on the products of fish processing factories and advises the industry on various steps to be taken to improve the quality of its product.

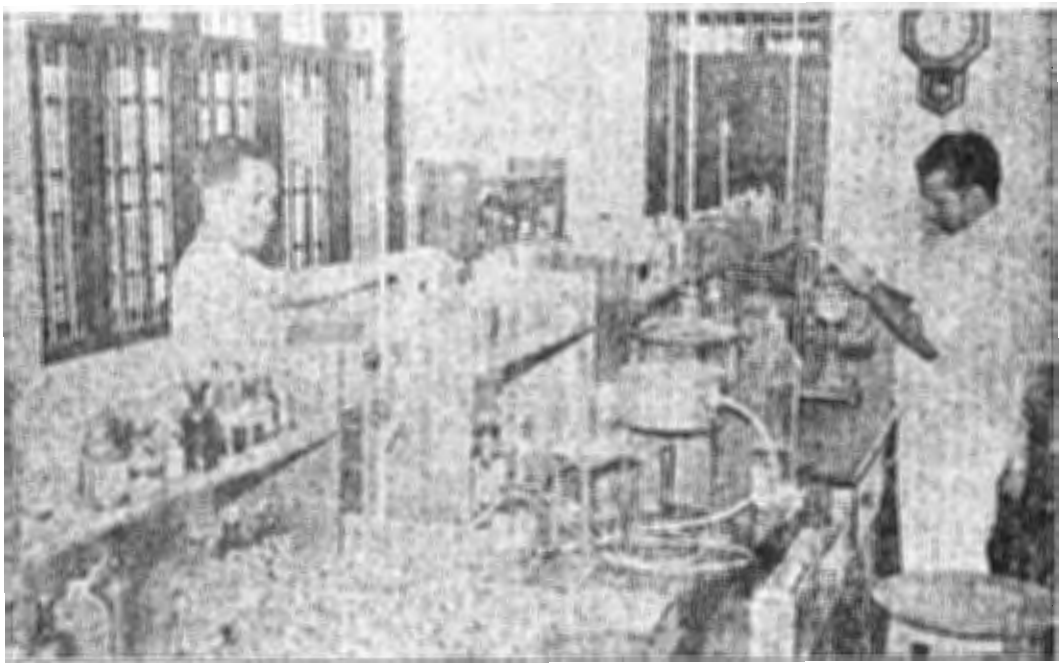
Some of the important research projects undertaken by the wing are listed below:-

1. Storage characteristics of fish and crustaceans like prawn and lobster held in ice, including studies on optimum conditions of icing, biochemical changes taking place during ice-storage, loss of nutrients due to leaching, the amenability of ice stored fish and shell fish for processing etc. Studies on fresh fish preservation — use of permitted chemicals and antibiotics as well as application of physico-chemical processes like pasteurization for preservation of fish and prawn for longer periods without ice.
2. Studies on use of refrigerated brine and seawater for preservation of fish as compared to storage in crushed ice.
3. Biochemical and bacteriological investigations on frog legs including studies on improvement in the colour of blue frog legs. (Photo 5)
4. Studies on flavour bearing compounds in fish — causes of flavour changes in ice stored fishery products.
5. Studies in problems relating to protein denaturation in frozen fish.
6. Examination of microflora in fish — study of their distribution in the different parts of the fish and the specific role of each organism in the spoilage pattern during storage at some temperature in ice.
7. Investigations on the occurrence of salmonella and shigella organisms in raw and processed fish — survey of commercial fish-meal samples for the presence of these organisms and study on their survival during various stages of preparation of meal by different methods.
8. Studies on the incidence of faecal contamination organisms in fresh and frozen fishery products, their survival during preparation, processing and subsequent storage and methods of prevention of contamination. (Photo 6)
9. Evolving speedy and efficient methods of identification and quantitative enumeration of the above organisms.

(Photo 4a)

A winch designed at the Institute being operated for performance studies from one of the fishing boats at the Institute.

(Photo 5)



A general view of the section of the chemical laboratories of the Institute

10. Work on evolving rapid methods of assessment of freshness of fishery products.
11. Studies on nature and composition of 'drip' formed in frozen fishery products in relation to condition of raw material, period of ice storage etc. and experiments in using different glazes and packing methods for its prevention.
12. Studies on the effect of difference in frozen storage temperature on quality and shelf life of frozen products.
13. Studies on the effect of freezing time and different raw material temperatures, on the physical, chemical and bacteriological conditions of the finished products.
14. Studies on the utilization of indigenous materials like coconut pith for the manufacture of insulating materials.
15. Design and construction of containers for transport of fresh and ice stored fish.
16. Studies on causes and prevention of "belly bursting" in frozen and cold-stored sardines.
17. Development and standardization of methods for canning of different varieties of fish and prawn.
18. Studies on causes and prevention of 'sloughening' in canned prawn during storage. (Photo 7)
19. Evolving methods for the preparation of pre-cooked foods from prawn and fish.
20. Survey and evaluation of quality of manufactured fishery products in the country in relation to factory sanitation and investigations to improve the quality of such products.
21. Experiments on drying and dehydration of fishery products — design and operation of artificial dryers, determination of optimum drying conditions for different products etc.
22. Studies on causes and prevention of discolouration in dried prawn pulp — including experiments in pre-treatment of prawn before drying.
23. Studies on preparation, properties and storage characteristics of fish-meal from different varieties of fish and fish wastes.
24. Work on evolving improved methods for the extraction of body oil from sardines.
25. Utilisation of sardine oil for industrial purpose.
26. Utilisation of prawn head and shell waste in mixed feed for poultry and for the preparation of chitin, glucosamine hydrochloride, amino acid concentrates and compounds like cholesterol.
27. Studies on the preparation of edible fish flour.
28. Studies on the preparation of bacteriological peptone from fish flesh — standardization of methods, and study of the properties.

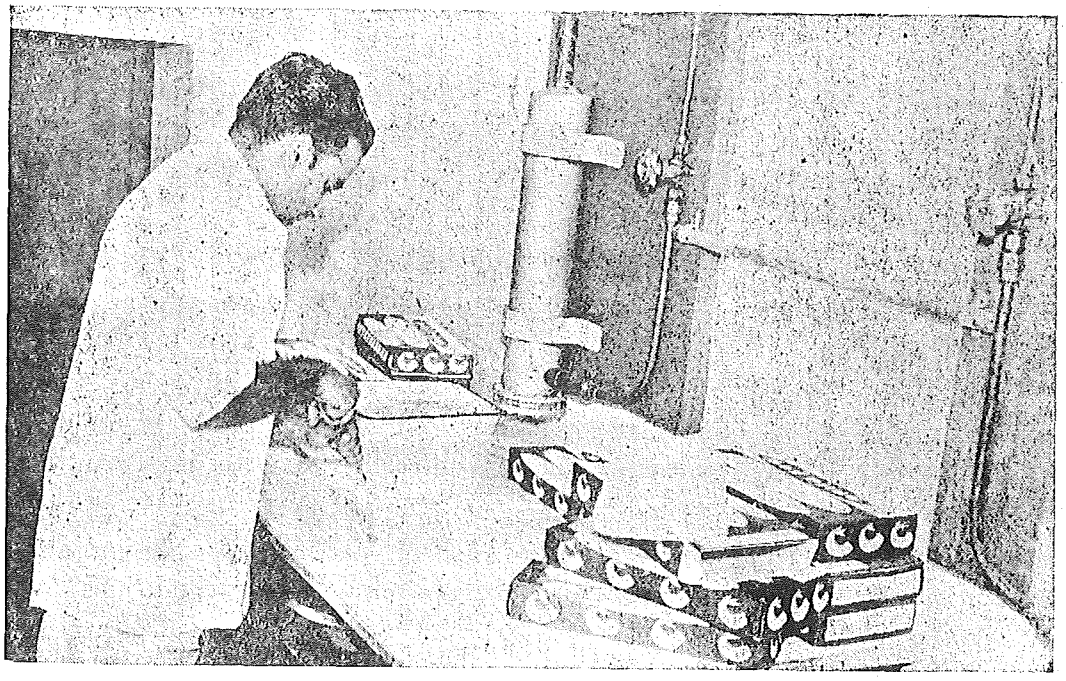
29. Evolving and standardizing methods for the preparation of acid ensilage, hydrolysates and pastes from fish.

30. Working out optimum conditions for salt curing of commercially important fishes including theoretical studies on denaturation of protein, loss in soluble nutrients and microbiological changes during the salting process. (Photo 8)

31. Standardization of methods for the production of 'masmeen' from Tuna.

32. Problems in tenderization of meat in dried fishery products and reconstitution properties of dried and salted fisheries products.

33. Studies on the effect of harmless preservatives in improving the shelf life of salt cured and pickled fish.



(Photo 6)

Samples being drawn from frozen fish blocks for bacteriological examinations.

The projects listed above are aimed at improving the existing techniques or at finding out new avenues of utilization of fishery products. They are also intended to provide the fish processing industry with much needed background of basic data on the technology of fish processing. The Processing Wing of this Institute is fulfilling these objectives to the maximum extent possible and, during the short period of its existence, it has contributed substantially to the development of the industry.

Extension, Information and Statistical Wing

The Extension Section was established in the year 1961, which was subsequently expanded to form the third wing of the Institute by adding the other two sections, the Information Section and the Statistical Section in the year 1963. This wing of the

(Photo 7)

Canned prawn being examined for the quality evaluation.

(Photo 8)

Experiments being carried out for improvements in the methods for salt curing of fish and use of chemical preservatives for enhancement of storage life of cured fish. A salt cured fish being examined after treatment with the preservative and after storage for some months.

Institute aims at maintaining a liaison between the research laboratory and the industry. The main functions of the wing are as below :—

1. Technical assistance to the fishing and fish processing industry.
2. Dissemination of the scientific and technical results obtained by investigations carried out in the other two wings of the Institute.
3. Answering scientific and technical queries on fisheries technology received from State fisheries departments, the industry and interested individuals.

The dissemination of scientific and technical information is done through various media such as the Newsletter published every three months, pamphlets, booklets, information sheets etc. in which the scientific and technical findings of the Institute are given in a non-technical language and by participation in exhibitions and field demonstrations.

The Information Section has been regularly answering technical queries received on different aspects of fisheries technology. The queries are answered on the basis of the results obtained in the laboratories of the Institute, by collecting information from other available sources and wherever necessary by undertaking studies on the problems.

The Statistical Section of the wing apart from giving assistance to the different sections in the Institute in their researches and investigations also undertakes study of problems in the industry that need survey, collection of data and statistical evaluation in order to establish norms and standards.